FOREST INSECT CONTROL

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BIOLOGICAL EVALUATION

ENVIRONMENTAL IMPACT EVALUATION

COST-BENEFIT EVALUATION

JULIAN-CUYAMACA ZONE OF INFESTATION
LAGUNA MOUNTAIN PROJECT
CLEVELAND NATIONAL FOREST
SAN DIEGO COUNTY

APRIL 1974

CALIFORNIA REGION
DIVISION OF TIMBER MANAGEMENT
BRANCH OF PEST CONTROL

FOREST SERVICE
U. S. Department of Agriculture

630 SANSOME STREET
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ENVIRONMENTAL IMPACT EVALUATION
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INTRODUCTION

The timber stand on the Laguna Mountains currently harbors a high population of California flatheaded borer in Jeffrey pine. Populations of pine engraver beetles in Jeffrey pine and western pine beetles in Coulter pine are at a low level. An estimated 3,250 dead or dying pine on 9,350 acres are infested with one or more species of the beetles. At present the best method to attain suppression is through maintenance control. One part of maintenance control is direct control, i.e., the infested trees will be logged, removed by woodcutters or felled and sprayed with an insecticide.

In large infestations, the best method to suppress the beetle populations is by removal of infested material through logging and fuelwood cuts. Large volumes of infested material are removed, treatment expenses are kept low and need for chemical control is minimized.

Infested trees adjacent to structures and in or near campgrounds or other special or high-use sites do not lend themselves well to removal through logging or fuelwood cuts. Yet these infested trees, though only a small percentage of the total, are precisely those with the highest priority for control because of their proximity to other high-value uninfested pine. Chemical treatment with an insecticide is best suited for these problem areas. The insecticide lindane is registered and recommended by the Forest Service for California flatheaded borer and bark beetle control in California. Individual infested trees are felled, bucked and limbed and the bark sprayed with a 1.5 percent solution of lindane and diesel oil.

This evaluation primarily discusses the impact of the lindane-diesel oil treatment on the environment when used to treat insect-infested trees.

I. ENVIRONMENTAL IMPACT

Lindane spray will be applied in low dosages to individual felled trees. Lindane-diesel oil forms a tissue deposit (no lindane on bark surface), so environmental contamination will be kept to a minimum. One of the major concerns of organochlorine compounds, such as lindane, is that it may be transferred in the food chain through a phenomena called biological magnification. Dr. Francis Gunther (personal communication, Branch of Pest Control, Region 5), Chemist and Toxicologist, at the University of California,

(Riverside) stated that he knew of no instances where lindane went through biological magnification. Dr. Gunther is the editor of the 1970 edition of Residue Reviews and a renowned authority on insecticides. Macek (1970) said that lindane and methoxychlor would not be expected to be biologically magnified to any great degree.

A. Air

Lindane is stable to air, light, heat, and carbon dioxide. (Martin, 1968) No air pollution should occur through treating felled trees with a lindane-oil solution.

B. Natural Beauty

Much of the area is visible from roads, trails, and lakes. Because of the small number of trees to be felled the visual impact will be negligible. Slash created by insect control work will be handled in a manner that is consistent with the objectives of the Ranger District Multiple Use Plans and the Sub-Regional Guidelines. The removal of sorrel, and red-top trees from near and distant view areas will enhance the natural beauty, not detract.

C. Range and Plant Life

Lindane is considered to be nonphytotoxic at insecticidal dose levels.

D. Soils

With proper application procedures, very little of the lindane-oil solution should reach the soil. Lindane is moderately stable in soil and is fairly resistant to removal from the site of application by physical factors. (Lichenstein, 1959) Also, lindane degrades in soil to pentachlorocyclohexene (PCCH) which is more volatile than lindane, and does not remain in the soil to any extent. (Guenze, 1970)

E. Water

There are three small lakes in the actual project area and only a few intermittent streams. However, no infested trees will be felled in these stream courses. Lindane has very little movement in the soil, hence, there should be no effect on water quality or stream flow.

F. Fish and Wildlife

With the low dosage and direct application only to the bark or felled trees, no effect on fish and wildlife is expected.

Fish. Generally most insecticides are toxic to fish. The chlorinated hydrocarbons are particularly toxic. However, lindane is considered to be one of the safer chlorinated hydrocarbons. (O'Brien, 1967)

Brown and rainbow trout were all killed by exposure to 0.05 ppm lindane, but bluegills have survived 0.45 ppm of 12 percent lindane. However, bass and bluegill fingerlings suffered 50 percent mortality at 0.1 ppm of the same formulation. (Rudd, 1956) Four species of fish were exposed to water containing 0.03 ppm lindane. Two days after termination of exposure, the fish had eliminated 90 percent of the lindane. (Gakstatter and Weiss, 1967)

Birds. Numerous tests have been made feeding various birds on a diet of certain percentages of lindane. A 10 percent mortality of pheasants resulted from eating grain treated with one and two-thirds ounces of 75 percent lindane per 100 pounds over a 20-day period. However, other investigators were unable to detect noteworthy changes in the bird population of a 40-hectare pasture and woodland treated with 10 percent BHC (10 percent gamma) at approximately 50-70 pounds per acre. This application is about twice that normally employed. In addition, considerable field observation and experimentation in Germany have led essentially to the same conclusion. The small amounts of BHC that a wild bird could ingest would be insufficient to cause harm, due to the rapid disintegration of the material (BHC) within the animal body. (Rudd, 1956)

In summary, the National Academy of Sciences (1969), indicates that field applications of lindane have no toxic effect on birds.

Animals. The chronic toxicity of BHC, with the exception of the beta isomer (this isomer not in lindane) is relatively low. Technical BHC and lindane have been rated as one half and one quarter, respectively, the toxicity of DDT. Minimal storage, rapid elimination from the body and lesser degree of tissue damage are the criteria for this rating. (Lehman, 1950)

According to the National Academy of Sciences (1969) mammals metabolize lindane quite rapidly to trichlorobenzenes and phenols, which are excreted, and thus accumulate very little in the body fat. Hence, in mammals it has a low oral toxicity. (O'Brien, 1967)

G. Man

The U.S. Department of Health, Education and Welfare reports that there have been no confirmed cases of systemic poisoning in man as a result of repeated exposure to BHC (comparable to lindane). A Roumanian study showed no ill effects from massive inhalation of DDT plus lindane in a forest spraying operation; some workers inhaled 21 mg/kg of DDT as well as 6 mg/kg of lindane daily for 30 days. (O'Brien, 1967) Lindane is absorbed through the skin and other portals. Lindane has the highest mammalian toxicity but is

also excreted by the kidneys and hence, does not accumulate extensively. It therefore has the lowest toxicity on repeated dosages. (Hayes, 1963)

H. Wilderness Areas

There are no wilderness areas in the project.

II. ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

A temporary reduction of certain beneficial and associated insects as well as some soil arthropods is probable. Two common predators of the western pine beetle, Enoclerus lecontei and Temnochila chlorodia, are quite easily killed by lindane. (Swain, 1968)

III. ALTERNATIVES TO THE PROPOSED ACTION

A. Log Infested Trees

This method is very desirable in low use areas but difficult in recreation and heavily urbanized areas. Nevertheless, an extra effort will be made to log infested trees in fiscal 1975.

B. Removal of Infested Trees by Woodcutter

Usually only a small number of trees can be handled in this manner as it is difficult to remove the trees before insect emergence. Another problem is that the infested material must be removed from the forest environment if the treatment is to be effective. Hence, this precludes the use of local woodcutters.

C. Fell, Peel and Burn Infested Trees

The fire hazard in southern California generally will not permit this type of treatment. Also, the effects of charred debris and scorched vegetation is undesirable in most of the areas. Local Air Pollution Control Board ordinances prohibit burning in some areas.

D. Use Ethylene Dibromide Instead of Lindane

Ethylene dibromide is a fumigating insecticide and has limited effectiveness, particularly in cold weather. Because of its short residual life it will not protect the uninfested portions of treated trees from attack by forest insects. Ethylene dibromide poses a greater hazard to treatment crews than does lindane as it is notorious for causing skin irritations resulting from direct contact. Breathing its fumes causes lung irritation.

E. Discontinue Insect Control Work in the Area

This should be regarded only as a theoretical alternative as it would have an intolerably adverse effect on the land value and the forest resource that people value for temperature modification, recreation, esthetics, shade and timber production.

IV. IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

There are no irreversible commitments except the finality of cutting a tree which would soon become a snag. Some snags always remain for wildlife habitation. Also, tree regeneration may take place in areas where trees have been cut.

V. CONSULTATION WITH OTHERS

There is consultation on a special and continuing basis with State agencies, institutions of high learning, and other Federal agencies as well as Forest Service personnel. Some of the agencies involved are the California Department of Food and Agriculture, California Division of Forestry, California Department of Fish and Game, Fish and Wildlife Service, and Pacific Southwest Forest and Range Experiment Station. Institutions consulted include San Diego State University and the University of California at Berkeley and Riverside.

REFERENCES CITED

Anon. 1969. National Academy of Sciences. Insect-Pest Management and Control.

Gakstatter, J. H. and Weiss, C. M. 1967. The uptake from water by several species of fish of DDT, dieldrin and lindane; their tissue distribution and elimination rate. Amer. Fish Soc. Trans. 96:301-306.

Guenze, W. D. and Beard, W. E. 1970. Volatilization of lindane and DDT from soils. Soil Science Society of American Proceedings. May/June.

Hayes, W. J. Jr., 1963. Clinical Handbook on Economic Poisons.

Lehman, A. J., Hartzell, A., and Ward, J. C. 1950. Effects on beneficial forms of life, crops, and soil and residue hazards. Jour. Amer. Med. Assoc. 144:104-108.

Lichtenstein & Shultz. 1959. Breakdown of lindane and Aldrin in soils. J. Econ. Entomol. 52(1): 118-124.

Macek. 1970. The Biological Impact of Pesticides in th Environment. Environmental Health Science Series #1, Oregon State University Press.

Martin, Hubert. 1968. Pesticide Manual. Brit. Crop Protec. Counc.

O'Brien, R. D. 1967. Insecticides - Action and Metabolism, Academic Press.

Rudd, Robert L., and Genelly, Richard E. 1956. Pesticides: Their Use and Toxicity in Relation to Wildlife, Game Bulletin No. 7, Department of Fish and Game.

Swain, Kenneth M. 1968. Protecting Ponderosa Pine from Bark Beetle Attack Using Lindane-Water Emulsion Spray. Forest Service, USDA, Division of Timber Management, San Francisco, California (unpublished).

Thompson, W. T. 1967. Agricultural Chemicals Book I. Insecticides. Thompson Publ: Davis, California

COST-BENEFIT EVALUATION

LAGUNA MOUNTAIN PROJECT
CLEVELAND NATIONAL FOREST

INTRODUCTION

The Laguna Mountains lie 60 miles east of the City of San Diego and its 1.4 million residents. That population is predicted to reach 2.5 million by 1990. There were 682,000 visitor use days in the Laguna Mountains on National Forest land during Fiscal Year 1973. Visitor use was also heavy on private land though these figures are not available.

Resource Value. The Laguna Mountains represent the largest block of public owned coniferous forest in San Diego County. There are approximately 7,200 timbered acres of National Forest land and 2,150 timbered acres of private land for a total of 9,350 timbered acres. On National Forest timbered land are 7 campgrounds, 2 picnic areas, 2 organizational sites, 171 summer homes, 100 trailer spaces and 17 cabins, which offer the main forest recreation facilities available to the greater San Diego populace.

Land values in the Laguna Mountains are determined mainly by esthetic and recreational standards. Mountain coniferous forests which are available for recreation use are scarce in southern California. The value of trees for wood products is minor compared to that for recreation, residential and commercial purposes. Undeveloped land currently sells for $2,300 to $3,000 per acre while developed land retails at approximately $20,000 per acre.

Suppression Costs. An integrated control program will be used in Fiscal Year 1975 to treat the infested trees. Hopefully, most of the infested material will be removed as sawlogs with a portion of the residual and remaining small-diameter trees sold as fuelwood. This treatment method should return approximately the same amount of capital as was expended, and will save several thousand dollars which would have been needed for chemical control.

Chemical control will be required in developed areas. The Forest Service expects to treat an estimated 850 infested trees with insecticide for $11,962 or $14.07 per tree on National Forest land. A cooperative insect control project involving the California Division of Forestry, Forest Service, and San Diego County provides financing for the California Division of Forestry to treat infested trees on private lands. Approximately 800 trees will be treated with insecticide on private land with costs estimated to be $8,000 or $10.00 per tree.